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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/784,952	02/16/2001	Toshinori Ono	29287/117	4195

7590 06/18/2004  
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EXAMINER

UHLIR, NIKOLAS J

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 06/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/784,952

Applicant(s)

ONO ET AL.

Examiner

Nikolas J. Uhler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 April 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 11-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 11-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. This office action is in response to the amendment/arguments dated 04/05/2004. Applicant's amendment is persuasive in overcoming the previously applied double patenting rejection. Accordingly, this rejection is withdrawn. Currently, claims 1-8 and 11-16 are pending, with claims 3-7 withdrawn from consideration.

#### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 13 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 13 requires the perfluoropolyether to have "at least one of the functional group." It is unclear to the examiner whether the applicant is merely requiring the perfluoropolyether layer to have "a" (i.e. any) functional group, or whether the reference to "the functional group" indicates that the type of functional group on the perfluoropolyether must be the same type as contained in the DLC layer.

#### ***Claim Rejections - 35 USC § 103***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-2 and 12-13, and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yokosawa et al. (US6001479) in view of Ootake et al. (US5958542), as evidenced by Veerasmy (US6303225).

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6. Claim 1 requires a magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an underlayer, wherein the proportion of functional groups containing nitrogen per 100 carbons atoms in a diamond like carbon protective coating mainly composed of carbon for protecting the magnetic film exceeds 20%, wherein a lubricating film of a perfluoropolyether having at least one functional group is provided on the protective coating.

7. Regarding these limitations, Yokosawa et al. teaches a magnetic recording medium comprising a non-magnetic substrate, a metal base layer (equivalent to a seedlayer), a non-magnetic Cr underlayer, a magnetic layer (equivalent to applicants claimed magnetic film on a non-magnetic substrate by intercalating at least an underlayer), a protective layer, and a lubricating layer (column 3, lines 40-50; column 5, lines 30-50). The protective layer is formed of diamond like carbon (DLC), and the lubricating layer comprises a perfluoropolyether lubricant having a polar terminal group and a hydrocarbon lubricant (column 5, lines 30-67 and column 8, example 2). The functional groups present in the DLC film enable the perfluoropolyether lubricant to be absorbed into the DLC film (column 10, lines 1-13).

8. Yokosawa et al. does not teach a DLC film that has a proportion of functional groups containing N per 100-carbon atoms that is greater than 20%, as required by claims 1.

9. However, Ootake et al. (Ootake) teaches a magnetic recording medium having a substrate, a magnetic layer on the substrate, a protective layer on the magnetic layer, and a lubricant layer on the protective layer (column 3, lines 48-62). The protective layer

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is composed of diamond like carbon, and is suitably diamond like carbon, diamond like carbon containing hydrogen, or diamond like carbon containing nitrogen (column 3, lines 63-67). Suitably, a DLC film containing from 10-35 atomic % N or H is suitable (column 4, lines 10-16). These DLC protective films have many dangling bonds that promote high lubricant absorption (column 4, lines 48-50)

10. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a DLC film containing 35 atomic % N as taught by Ootake as the DLC film utilized by Yokosawa.

11. One would have been motivated to make this modification in lieu of the teaching in Yokosawa that a DLC film that promotes the absorption of a lubricant is suitable for use as the DLC film, and the fact that Ootake teaches the equivalence of pure DLC, DLC containing N, and DLC containing H as suitable materials for use as a protective film that promotes the absorption of a lubricant.

12. The examiner notes that it is known that doping a DLC film with nitrogen results in the formation of  $\text{NH}_2$  reactive groups on the surface of the film. Evidence of this fact is provided at column 7, lines 35-50 of Veerasamy. In view of this evidence, the examiner takes the position that the DLC film of Yokosawa as modified by Ootake (a DLC film doped with 35 atomic % N) will have 35  $\text{NH}_2$  groups per 100 carbon atoms and therefore meets the functional group requirement of claim 1.

13. Claim 2 specifically limits the types of functional groups on the surface of the DLC film of claim 1. These limitations are met as set forth above for claim 1, as the  $\text{NH}_2$

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functional groups on the DLC film of Yokosawa as modified by Ootake will be chemically bonded to the surface of the film, and thus have the structure  $\text{CNH}_2$ .

14. Claim 12 requires the functional groups to be identified by a specific tag modification method. The claim language utilized by the applicant only requires that the functional groups be identified by this method. The language does not claim the functional groups in their tagged state. Thus, the limitations of claim 12 are met as set forth above.

15. Claim 13 requires the magnetic recording medium to having a magnetic film on a non-magnetic substrate by intercalating at least a seedlayer and an underlayer mainly composed of Cr, wherein the proportion of functional groups having N atoms per 100 carbon atoms in a DLC film is  $>20\%$ , and a lubricating film of perfluoroether having at least one of the functional group.

16. For the purpose of this examination, the examiner interprets the language of claim 13 in the following manner. First, "at least a seedlayer and an underlayer mainly composed of Cr," is interpreted to require only the underlayer to be mainly composed of Cr. Second, "a lubricating film of perfluoroether having at least one of the functional group," is interpreted to mean that the perfluoroether must have "a" functional group, not necessarily one of the functional groups on the surface of the DLC film.

17. Bearing the above interpretation in mind, the limitations of claim 13 are met as set forth above for claim 1.

18. Claim 14 is met as set forth above for claims 1, 2, and 13.

19. Claims 15-16 are met as set forth above.

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20. Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yokosawa as modified by Ootake as applied to claims 2 and 10 above, and further in view of Hosoe et al. (US5759681).

21. Yokosawa as modified by Ootake as set forth above for claims 2 and 10 does not teach an magnetic recording apparatus having the elements recited in claims 8 and 11.

22. However, Hosoe et al. teaches a well known magnetic recording system for a multilayer magnetic medium, wherein the recording system comprises a drive section (equivalent to applicants driving part), a magnetic head having separate read/write sections (equivalent to applicants claimed magnetic head having a recording part and a reproducing part), wherein the reproducing part is magneto resistive, and read/write signal processing means (equivalent to applicants claimed signal processing part for sending and receiving signals to the magnetic head) (column 10, lines 40-65).

23. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the magnetic recording apparatus taught by Hosoe et al. with the magnetic recording medium taught by Yokosawa as modified by Ootake.

One would have been motivated to do so due to the teaching in Hosoe that a magnetic recording apparatus having the required structure of claims 8 and 11 are well known as suitable for use with multilayer magnetic recording media (such as the media taught by Yokosawa as modified by Ootake).

#### ***Response to Arguments***

24. Applicant's arguments filed 04/05/2004 have been fully considered but they are not persuasive. Applicant argues that Yokosawa teaches that the perfluoropolyether

containing lubricant having piperonyl groups as terminal groups is not a type of lubricant that chemically absorbs functional groups. As a result, the applicant argues that the adsorbed mechanism of the Yokosawa lubricant is different from that of the instant invention, and therefore that Yokosawa teaches away from the instant invention.

25. This argument is not persuasive. First, applicant's argument is moot in view of the fact that the mechanism by which the lubricant layer is adsorbed onto the DLC layer is not claimed. While the claims are read in light of the specification, limitations from the specification are not read into the claims. Second, even if this feature were claimed, the argument would be unpersuasive in view of the fact that the Yokosawa lubricant is not limited to perfluoropolyethers having piperonyl functional groups. Indeed, Yokosawa teaches specific examples wherein perfluoropolyether lubricants having hydroxyl (OH) functional groups are utilized (see column 8, example 2 of Yokosawa).

Perfluoropolyethers having hydroxy end group functionalities are well known to be able to chemisorb to the surface of a DLC film. Applicants own arguments and the Ruhe et al. article cited above provide evidence of this fact.

26. Applicants remaining arguments depend from the argument address above at sections 24-25. Accordingly, these arguments are unpersuasive.

### ***Conclusion***

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



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A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhler whose telephone number is 571-272-1517. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul J. Thibodeau can be reached on 571-272-1516. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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